PERSONAL EXPENSE MANAGER APPLICATION

COST ESTIMATION

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1. INTRODUCTION AND EXECUTIVE SUMMARY

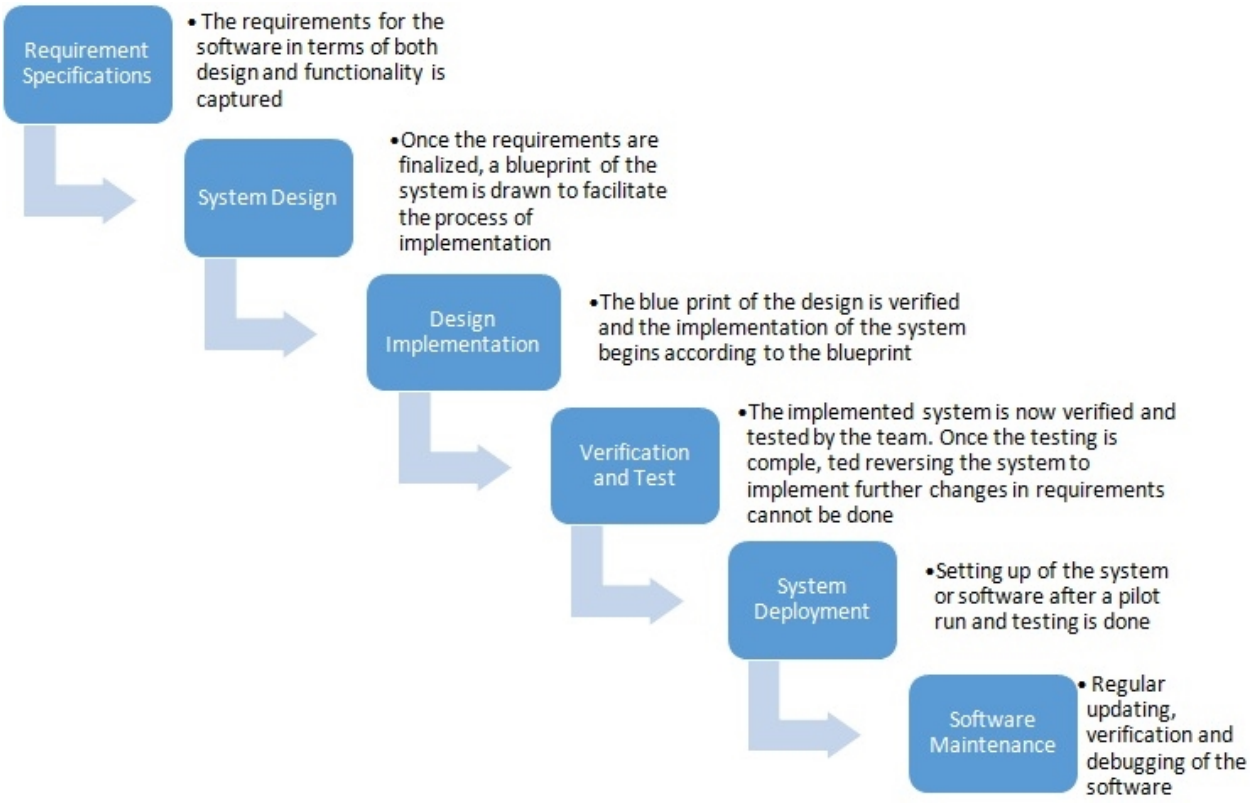
Personal Expense Manager Application (PEMA) is an android application to help users to be in control of their daily and monthly expenses by keeping track of the 50/30/20 budgeting rule. This app will use the total informed monthly incomes from multiple sources such as online banking, debit and credit card purchases, cheques, etc. and will calculate a daily allowance based on the number of days of the current month. The application will have various tabs such as profile, income, savings, expenses and statistics. Users will able to link google account with the application. The app will be free of cost but will have some in app purchases to enjoy premium user benefits. The app will be linked to 3rd party vendors for credit card payments as well as online wallets such as PayPal. The application is to be made live for use by May 18, 2019.

This report highlights the cost estimates that will be incurred for the various tasks of developing the website. The methodology we will be following for this project is Waterfall as it is a medium sized project and there is a clear picture of what the final product should be and also there won't be any possibilities to change the project's scope once it has begun. Also the project team will do extensive risk analysis and will try to mitigate most of the risks as it is an experienced team and they have handled such projects in the past.

2. DEVELOPMENT PLAN

Since the project is of medium size, we would be employing Waterfall model. The reasons behind employing a Waterfall model is that the model is simple and easy to use also as the methodology is quite rigid, it's easy to manage it because every phase consists of a review process and specific deliverables and the customer requirements are clear.

The project will be in 6 phases: Requirement Specifications, System Design, Design Implementation, Testing, System deployment and Documentation, Maintenance. The project time frame is of 3 months, starting from Feb 18, 2019 and release is scheduled on May 18, 2019. It is of vital importance that we maintain a tight schedule and very aggressive deadlines for each phase of the Waterfall model. There are 3 developers and 2 testers in the team. All team members are well experienced working on android application development project. The team follows a good practice of documenting heavily after each phase of the project as they have worked on many android projects following waterfall model.



3. RESOURCES REQUIRED

The following resources and their costs are as follows:

Serial No.	Resource Name	Resource cost
1.	Developer 1	$50 per hour
2.	Developer 2	$50 per hour
3.	Developer 3	$50 per hour
4.	Tester 1	$50 per hour
5.	Tester 2	$50 per hour
6.	Project Manager	$100 per hour
7.	Office work space	$20,000
8.	6 Lenevo thinkpad carbon X1 workstations	$11,604 @$1934 each
9.	3 Google pixel (android) devices for testing	$2,100 @$700 each
10.	1 smart touch screen board and printer	$246
11.	6 Security software and 6 testing software (Selenium)	$1200
12.	6 Android studio license and Source tree license (for configuration control)	$450 @$150 pm
13.	Payment gateway and power BI integration	$882 @$294 pm
14.	Database, Server and primary storage	$50,000
15.	Health Insurance of team	$27,000
16.	Tax charges and Miscellaneous	$12,000

4. COST STRUCTURES

4.1. SOURCE LINES OF CODE

The system shall be an android application to help users to be in control of their daily and monthly expenses by keeping track of the 50/30/20 budgeting rule. This app will use totally informed monthly incomes from multiple sources and calculate a daily allowance based on the number of days of the month. This app will keep the expenses of the users in check and will help them to achieve specific goals by letting them know the expenses and savings statistics. The app contains 5 sections such as profile, income, expenses, statistics and savings. The profile section will contain the personal information of the user and it will be linked to google account of the user as well. The income section will register the payments and money deposited into the bank account. The expenses section will record daily expenses and also will categorize them as wants, needs and saves depending on which the user can decide and control the further expenses in order to achieve specific goals. The savings section will subcategorize saves and also allows user to set specific goals so that it can be met (purchased) with the saved money. The statistics section summarizes key information, such as overall income, total monthly allowances per category, total daily allowances per category, etc. It also display graphs of planned vs. actual which helps user to know about his expenses and savings. System will provide advertising space. The estimate of the source line of code is around **5000 SLOC** to meet the requirements.

4.2. SCALE DRIVERS

PRECEDENTEDNESS: It will measure the similarity of the current project with the ones that have been undertaken by the team earlier. Since it is an android project and the team has developed such projects in the past as well, we have marked the precedentedness as **Very High - Largely Familiar**.

DEVELOPMENT FLEXIBILITY: It will measure the flexibility of the requirements that are supposed to be met by the team. Since most of the requirements are stable and very few are expected to be changing, we have marked development flexibility as **Very Low - Rigorous**.

ARCHITETCURE/RISK RESOLUTION: It measures the degree to which the architecture has been defined. Since, the architecture has been laid down well and is violated to avoid major risks, we kept architecture/risk resolution as **High – Generally (75%)**

TEAM COHESION: It depends on the relationships between the stakeholder and my team. As there will be good initial interaction with the team for working with the requirements and later on much interaction is not needed as the requirements at the start will be clear and also we are following a waterfall model. Hence, we have kept the team cohesion as **Very High – Highly cooperative.**

PROCESS MATURITY: It depends on the SEI Maturity Scale of the company i.e. how the company manages different process be it documentation or coding standards. Assuming the company has well set of processes in place therefore keeping process maturity as **High – SEI CMM Level 3.**

4.3. COST DRIVERS

ANALYST CAPABILITY COST DRIVER (ACAP): Analysts are personnel that work on requirements, high level design and detailed design. It is the measure of analyst. In our team one of the developer is working as designer and have adequate level of analysis and design skills and is also good in communication and cooperation within the team and with stakeholders as well. Hence, we have kept it as **High – 75th percentile**.

APPLICATION EXPERIENCE COST DRIVER (AEXP): It is a cost driver related to experience of the project team held on such type of applications. Since, our team is very well experienced in android application development we have kept it as **High – 3 years**.

PROGRAMMER CAPABILITY COST DRIVER (PCAP): It is a cost driver related to the capability of programmers working, coordinating as a team. Since the team is composed of experienced programmers that have worked before as a team on similar projects we are taking this factor as **High – 75th percentile**.

PLATFORM EXPERIENCE COST DRIVER (PLEX): It is a cost driver related to the experience of the team working on various platforms. Since, the team has also undertaken such projects in the past, we have kept it as **High – 3 years**.

LANGUAGE AND TOOL EXPERIENCE (LTEX): It is a cost driver which measures the experience of the team with the language and tools that will be used for this project. Since our team has knowledge and experience of the language and tools as they have worked on similar type of projects in the past, we have kept it as **High – 3 years.**

PERSONAL CONTINUITY COST DRIVER (PCON): It is a cost driver related to continuity of the personnel with the organization and is measured in terms of turnover per year. Since most of the team members are working with the organization from quite some years but some might leave seeking for new opportunities. Hence, we have kept **Nominal – 12% year**.

USE OF SOFTWARE TOOLS COST DRIVER (TOOL): It is a cost driver which provides an measure on the complexity of the tools that the team will use for the development of the project. Since our team will use basic life-cycle tools which are clean and simple, we have marked use of software tools as **Nominal – basic lifecycle tools, moderately integrated.**

MULTISITE DEVELOPMENT COST DRIVER (SITE): It is a cost driver which provides an measure about how the team is split and how well do they communicate. Since our team will mostly be located in the same city, we have kept it as **High – Same City or Metro Area.**

DEVELOPMENT SCHEDULE COST DRIVER (SCED): This rating measures the schedule constraint imposed on the project team developing the software. We have the target of completing the project on time and we are following normal development schedule as **Nominal – 100% of default schedule**.

EXECUTION TIME CONSTRAINT COST DRIVER (TIME): This is a measure of the execution time constraint imposed upon a software system. Since it is an android application, it will use very high execution time although it depends on the version of android and the tool used to develop the app but we assume it be extensive. Hence, we have kept is as **Very High - 85% use of available execution time.**

MAIN STORAGE CONSTARINT COST DRIVER (STOR): This rating represents the degree of main storage constraint imposed on a software system or subsystem. We have rated it as **Very High – 85%**.

PLATFORM VOLATILITY COST DRIVER (PVOL): It is a measure based on how often the platform changes due to updates or any other reason. Since the platform that we are using will not change much because we are using Waterfall model, we have marked it as **Low - major change every 12 mo.; minor change every 1 mo.**

REQUIRED RELIABILITY COST DRIVER (RELY): This is the measure of the extent to which the software must perform its intended function over a period of time. Since there won't be much of severe consequences because of software failure, we have marked required reliability as **Nominal - moderate, easily recoverable losses**.

DATABASE SIZE COST DRIVER (DATA): This measure attempts to capture the affect large data requirements have on product development. Since we will require large data for testing purposes such as good number of user profiles and their expenses and savings in order to check the application for withstanding high amount of data, we have marked database size as **High - 100 D/P < 1000.**

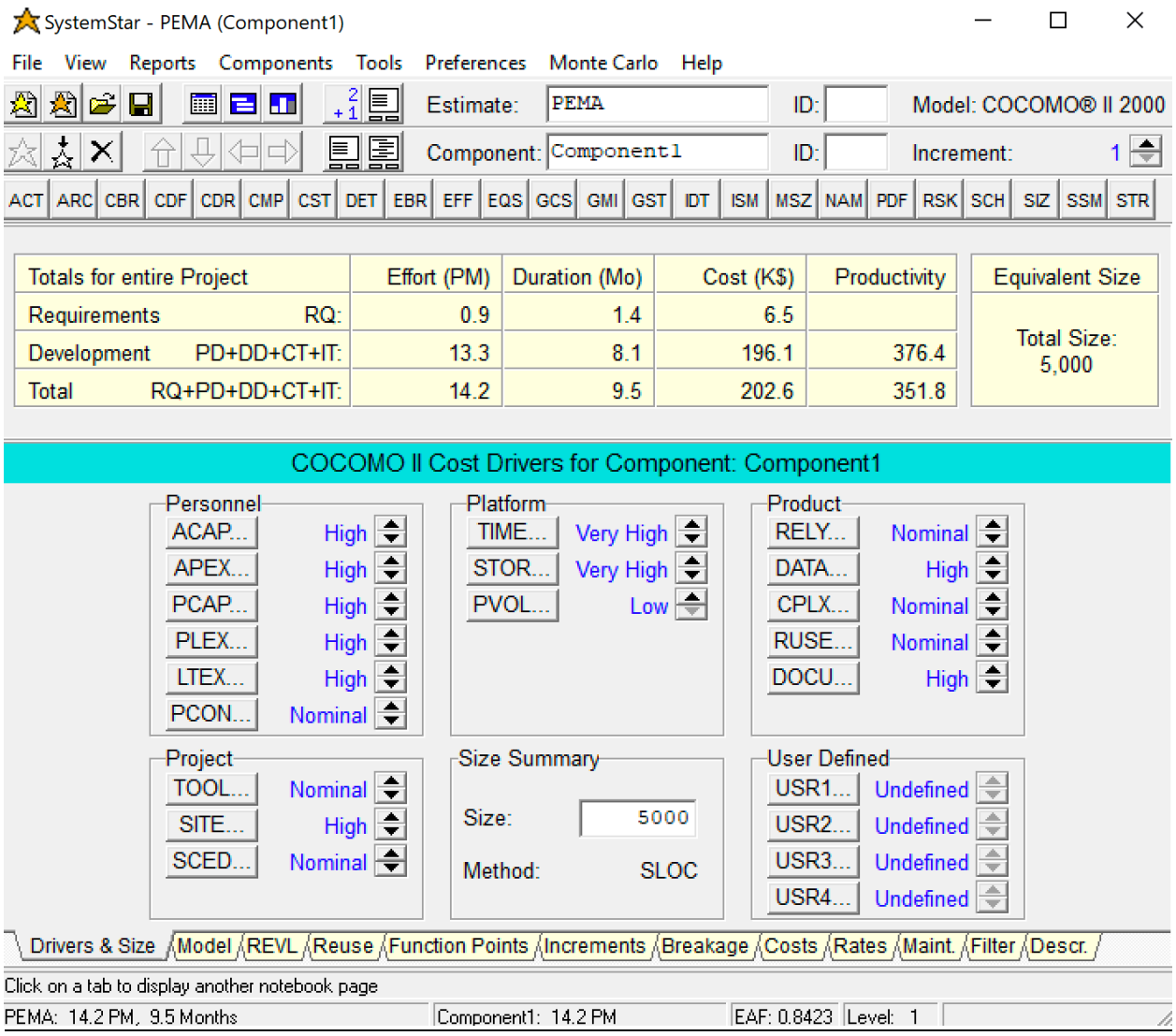
PRODUCT COMPLEXITY COST DRIVER (CPLX): It is a cost driver which provides an measure based on the complexity of the software being developed. Since our system will have good number of loop codes, multiple files for exporting user statistics, attractive GUI and touch sensitive buttons. we have kept it as **Nominal**.

REQUIRED RESUABILITY COST DRIVER (RUSE): This cost driver accounts for the additional effort needed to construct components intended for reuse on the current or future projects. This effort is consumed with creating more generic design of software, more elaborate documentation, and more extensive testing to ensure components are ready for use in other applications. We as a team are going to have contract with the stakeholder for only this project. Hence, we have kept it as **Nominal – across project**.

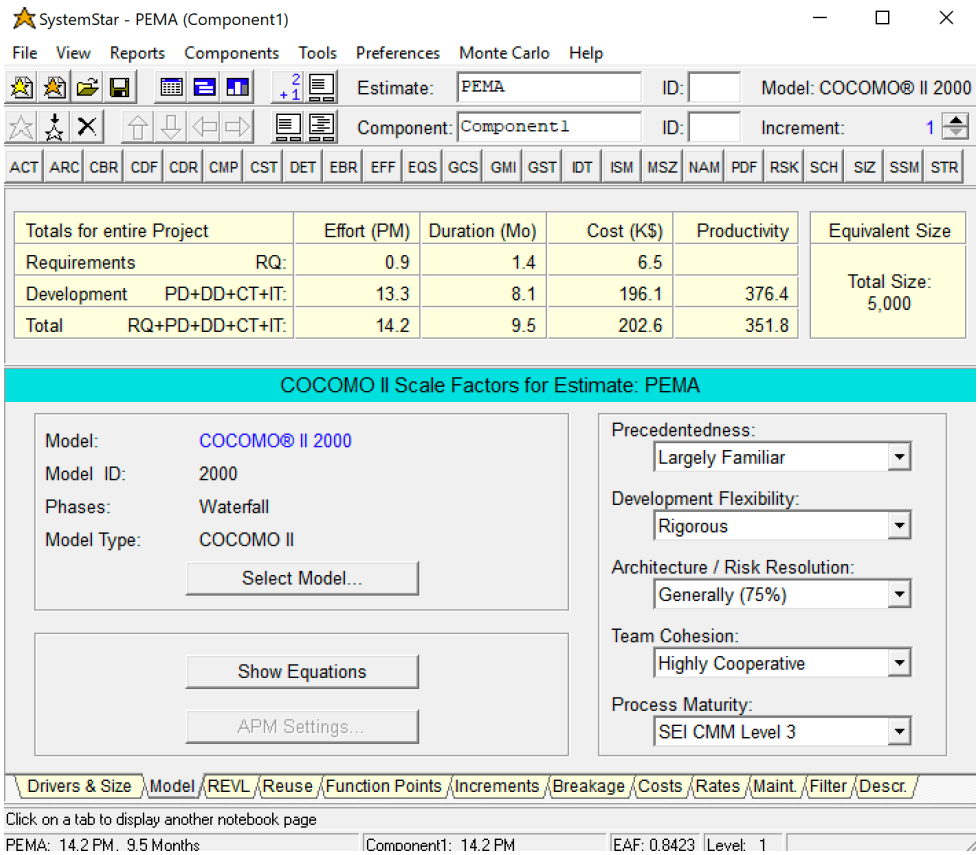
DOCUMENTATION MATCH TO LIFE-CYCLE NEEDS (DOCU): It is a measure which is largely dependent upon the documentation that we are creating in the product development. As we are following a Waterfall model and comprehensive documentation is required for this project as we will be doing such kinds of projects in future as well. Hence, we have kept it as **High - Excessive for life-cycle needs**.

4.4. SOFTSTAR (COCOMO) ESTIMATE

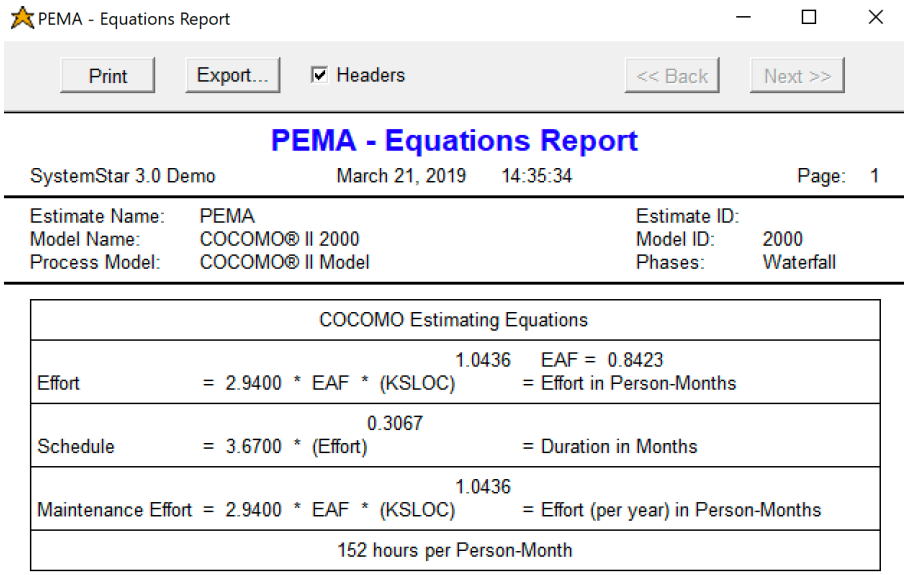
We are using SystemStar software to generate estimates of COCOMO.



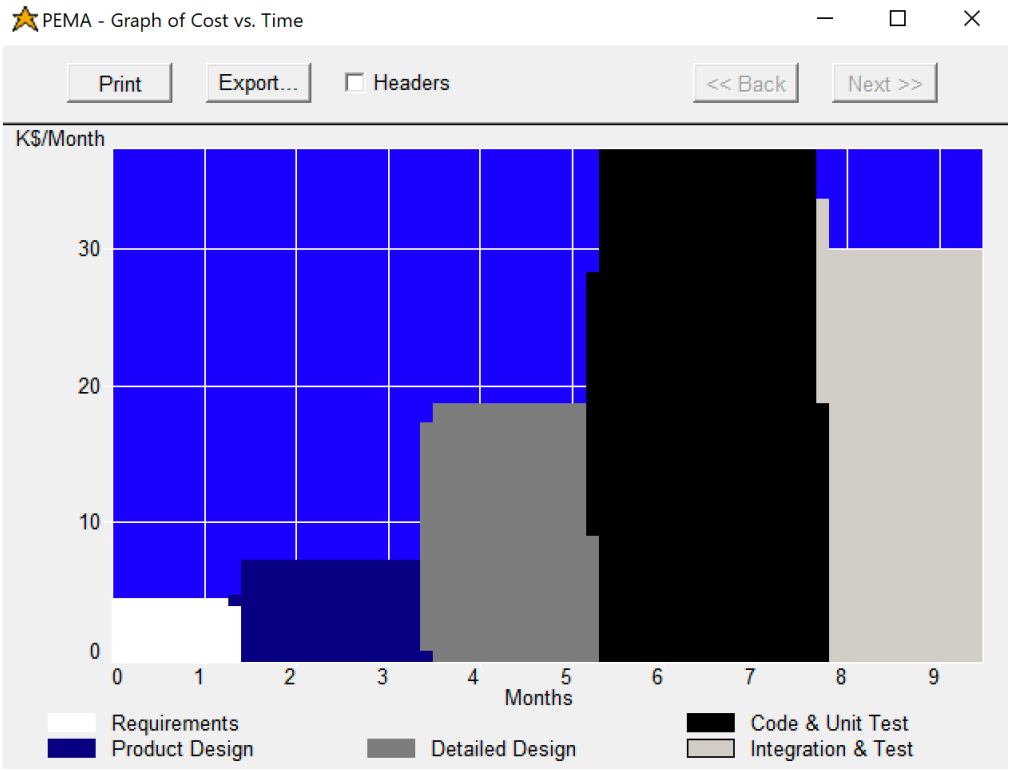
COCOMO scale drivers



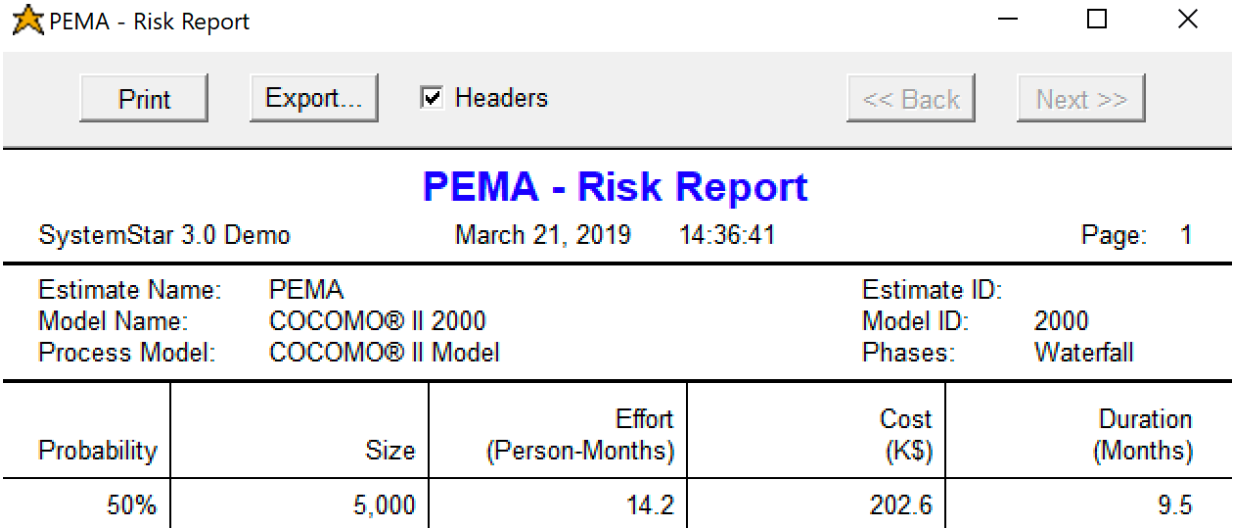
Equation report



Graph of cost vs. time



Risk report



PEMA - Risk Report

SystemStar 3.0 Demo March 21, 2019 14:36:41 Page: 1

Estimate Name:	PEMA	Estimate ID:	
Model Name:	COCOMO® II 2000	Model ID:	2000
Process Model:	COCOMO® II Model	Phases:	Waterfall

Probability	Size	Effort (Person-Months)	Cost (K$)	Duration (Months)
50%	5,000	14.2	202.6	9.5

5. ASSUMPTIONS

- Customers must be 16 years or older.
- Team has worked on many android application development projects and are experienced in this field.
- Application will be able to handle on an average 10,000 requests per day.
- Application will require 2 factor authentication security to process in app purchases.
- At least 1000 customers can be signed in at the same time on the app.
- Application users can add maximum 50 types of custom subcategories in the categories of wants, needs and saves.
- In app purchases will unlock an premium mode of the app which allows users to get notifications about their progress in towards achieving the goals set in saves category and also how they should progress to achieve that by showing different ways.
- Customers can be of any country but premium mode works only in a specific country.
- **Overhead costs** are calculated as 10% of total costs estimated by COCOMO Tool, hardware and software costs and paid vacation costs which is enough to cover health insurance, office rent, team lunch/dinner etc.
- Application is compatible with all versions of android starting from Android version 6 Marshmallow till the latest ones.
- We are not considering maintenance cost in our estimate.
- We are considering paid holidays of employees except manager in the estimates of COCOMO cost for the project.
- We are using source tree software to maintain versions of code which act as configuration control over the entire project.
- We are using selenium to test the software and also google pixel devices (android device) to test the app.
- I have updated my hardware costs as compared to my 1st assignment as I used cheaper hardware setup especially for primary storage and server which are reliable and sufficient for this project which is of medium size.

6. RISKS AND MITIGATION

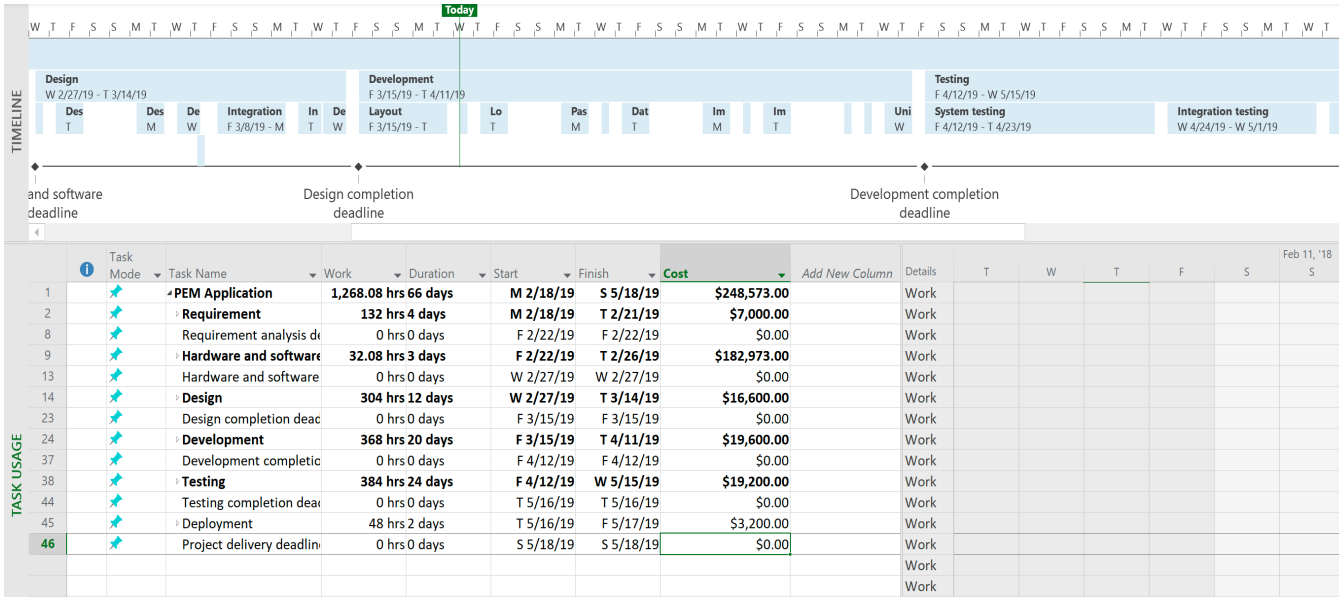
- This application is not available for IOS users.
- Not possible to track location of the user when he records the expense in the app. This is enabled as a manual option to add the location.
- App server gets shutdown.
- Payment transaction while making in app purchases gets unsuccessful but user amount is deducted from bank account.
- Transaction's privacy should not get compromised. To ensure that we protect the payment gateway with advanced software for encryption and decryption of transactions.
- To ensure that the customer centric sensitive data is encrypted properly to avoid the potential risk of data thefts by hackers.
- The team is very well experienced in android application development and is well aware of most of the potential risks and will implement mitigation techniques to overcome risks.

7. COST AND DURATION ESTIMATE

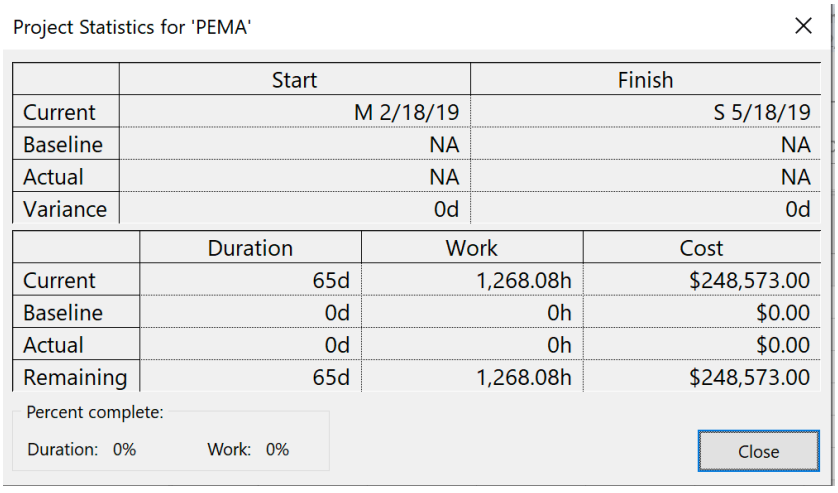
7.1. COST ESTIMATE

Assignment 1 cost estimates:

From Assignment 1 the costs for various phases in waterfall model are mentioned below these are the costs of the human resources for the duration of project as per the phase.

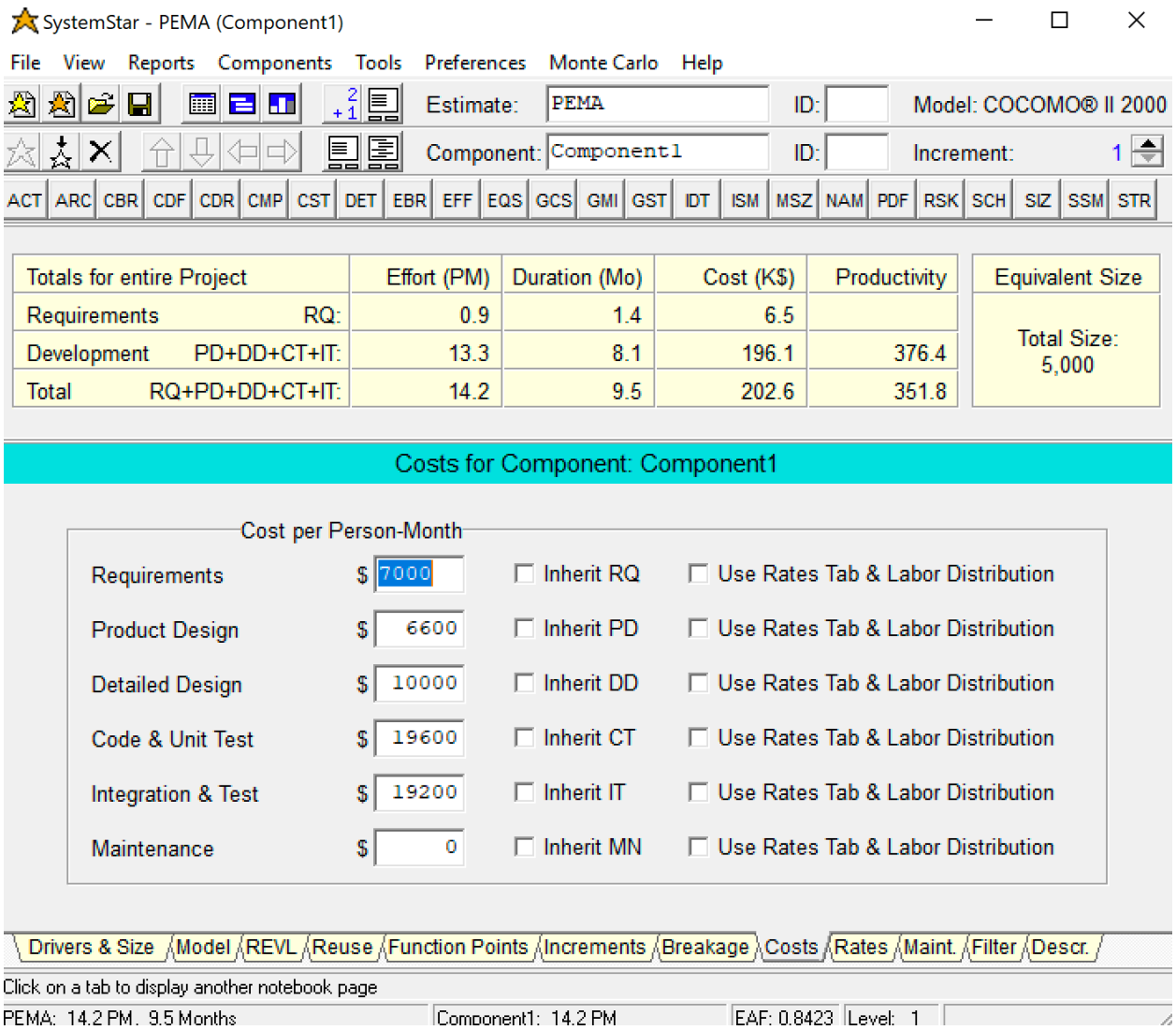


Cost for the project in PEMA mpp.



Cost for the entire project including 50% profit = $372,859 **(**from assignment 1)

In order to get COCOMO estimate the costs entered into the SystemStar software are as per the phases of the waterfall model in terms of person-month.



The various factors considered for cost estimation are:

COCOMO cost estimate	$202,600
Hardware cost	$63,950
Software cost	$2,532
Paid vacation for each team member for 1 week	$8,000
Total	$277,082
10% overhead cost of Total	$27,708
Cost considering overhead cost	$304,790
Cost including Profit @ 50%	**$457,185**

7.2. DURATION ESTIMATE

The duration of the project will consider following factors:

COCOMO Estimate (Nominal Schedule)	9.5 months
Vacation for each team member	1 week (0.25 month)
Total vacation for whole team	1.25 months (Total 5 weeks)
Total duration of the project	10.75 months

In order to finish our project in 75% of the nominal schedule (as determined by a previous COCOMO estimate). Assuming that SCED has a rating of Very Low, COCOMO produces these estimates.

COCOMO Estimate keeping SCED as very low	7.1 months
Vacation for each team member	1 week
Total vacation for whole team	1.25 months
Total duration of the project	**8.35 months**

8. CONCLUSION AND RECOMMENDATION

Personal expense manager is an android application to help users control their expenses and achieve goals set by them by utilizing their savings. It is a very nice idea as most of the people find difficulties in managing their expenses, this application will be very useful for them and will get good ratings and appreciation from lots of users. The major benefit of the application is that it is free of cost, even though there are in app purchases but that fees is to minimal considering the benefits the users will get from this app. The major success of this application will be its very sleek, elegant and user friendly UI.

The duration of the project is **8.35 months** and it is not feasible to complete the project within **3 months** of given time period due to functionalities and expected size of the project. The testing phase of the project will consume the maximum amount of time. The project is estimated to cost **$457,184** which includes all the costs to the company and profit at **50%**. It is recommended that due to time constraints we need to change our model from waterfall model to incremental development model and deliver initial version of the application with major functionalities which will be sufficient for majority of the users and later on functionalities can be added to the app by providing updates to the app.

Some more recommendations which can be included in the app in future are as follows:

1. Payment via many platforms such as cryptocurrency and app credits.
2. Various themes for the application's UI.
3. Allowing functionality to calculate taxes in app and also various tax saving schemes so that they can have an option to get tax benefits.
4. To include a feedback option from the users in the app then providing beta versions of app to the interested users to check the new features as per their suggestions.

APPENDICES

1. https://www.altexsoft.com/blog/engineering/comparing-automated-testing-tools-selenium-testcomplete-ranorex-and-more/ - selenium cost reference

2. https://blog.ganttpro.com/en/waterfall-project-management-methodology-pros-and-cons/ - waterfall model reference

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